



Lunenburg Duplex Project

Lunenburg, Massachusetts

PROJECT SNAPSHOT

Project Type: Duplex

Conditioned Area: 1,650 sq. ft. per unit

Completion Date: November 2024

Builder/Architect: [RE]Architect
(Design-Build) – Jamie Schwadel

HERS Rater: Pete Ruiz, Projected 2 Perform LLC

Code Pathway: Permitted under the Stretch Energy Code (225 CMR 22.00), Energy Rating Index Pathway

PROJECT OVERVIEW

The Lunenburg Duplex shows how small projects can meet stretch code standards while maintaining affordability and design quality. Replacing a deteriorating lakeside home, the design reused the original footprint to comply with conservation and zoning limits while complying with the **2023 Stretch Code**.

Architect Jamie Schwadel of [RE]Architect led the project, applying her firm's expertise in high-performance building design.

"We're trying to introduce smaller but nicer houses to these markets. People are paying a lot for homes that aren't energy efficient. We wanted to change that." - Jamie S.

The duplex includes two 3-bedroom, 3-bath units, each about **1,650 sq. ft.**, designed for energy efficiency, comfort, and affordability; demonstrating how compact multifamily housing can advance community and climate goals.

Design & Construction Approach

Code requirements and performance goals informed design decisions, from the envelope to the mechanical systems. The result highlights how adaptable material choices and construction sequencing can help small firms achieve high performance goals efficiently.

Envelope

The team used **closed-cell spray foam** throughout walls, roof, and crawl space, reducing time spent on exterior air-sealing.

Mechanical Systems

Each unit uses LG mini-splits for heating and cooling, **hybrid heat-pump water heaters**, and an **energy recovery ventilator (ERV)** for continuous ventilation. Indoor air quality has been monitored using [Awair](#) and [Broan](#) sensors since occupancy, with readings consistently indicating good air quality.



Solar and Electric Vehicle (EV) Readiness

Under Appendix RB, the project met solar ready requirements by including a designated solar-ready zone on the roof that provides space, structural support and electrical provisions for a future photovoltaic (PV) system. The owner chose to install the PV systems within a year of occupancy.

EV charging conduit was also installed during construction at a cost of approximately \$500.

“The new code requires you to at least have the conduit for solar. We did just get our solar turned on a month ago. It’s pretty awesome.” - Jamie S.

Cost Insights

The project was initially estimated to cost approximately \$660,000, or \$200 per square foot for 3,300 square feet of conditioned space, with an anticipated construction timeline of 6–8 months. Actual project costs reached approximately \$825,000, or \$250 per square foot, and construction extended from August 2023 through March 2025 (16 months).

Several unforeseen site conditions contributed to the increase in both cost and schedule. During construction, significant bedrock was encountered on-site, requiring additional excavation, cleanup, dumpsters, labor, and the installation of new pinned concrete foundations. These conditions resulted in an estimated \$20,000 change order, not including additional costs associated with project delays, lost time, and interest expenses.

To help manage costs while achieving high-performance goals, the project team selected spray foam insulation as a cost-effective strategy for air sealing and thermal performance. Windows with a U-Value of 0.27 were also chosen as a cost-effective option that met code requirements while balancing affordability and energy efficiency.

The project also benefited from \$9,240 in incentives and rebates, including a \$1,200 Huber Engineered Woods first-time user incentive and \$8,040 in Mass Save New Construction Program rebates.

Utility Insights

Solar panels were installed in September 2025, with 14 panels serving each unit. Although roof space limited the system size, the homeowners reported receiving a credit on their utility bill from the power generated for the April-May billing period.

Component	Performance Metric	Notes
HERS Index	38	Each unit tested separately
Air Changes per Hour (ACH50)	<2	Exceeds code requirement (≤3 ACH50)
Windows	U Factor: 0.27	Meets stretch code baseline
Energy Systems	All-electric	Mini-splits, heat pump water heaters, ERV

Outcomes & Lessons Learned

The Lunenburg Duplex demonstrates how design-build teams can combine practicality and innovation to meet the Massachusetts Stretch Energy Code. Compact, efficient, and all-electric, it offers a replicable path for builders exploring innovative approaches to compliance across both single- and multifamily housing, especially for those pursuing redevelopment projects. Phase 2 will involve constructing a vertical (“up-down”) duplex on the adjoining lot. The team plans to integrate Zip-R9 exterior insulation, a structural panel system with built-in exterior insulation, and use the project to build familiarity with newer envelope materials amongst the construction crew.

“Lessons from this project are informing a second duplex now under design, with added exterior insulation and continued all-electric systems.” - Jamie Schwadel



Special thanks to Jamie Schwadel, Licensed Architect at [RE]Architects, for sharing her insights for this case study.

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